CHAPTER 13

THE ACCOUNTS PAYABLE/ CASH DISBURSEMENTS (AP/CD) PROCESS

LEARNING OBJECTIVES

AFTER READING THIS CHAPTER, YOU SHOULD BE ABLE TO:

- DESCRIBE THE RELATIONSHIP BETWEEN THE AP/CD PROCESS AND ITS BUSINESS ENVIRONMENT.
- SUMMARIZE HOW VARIOUS TECHNOLOGIES, INCLUDING E-INVOICING AND E-PAYMENTS, CAN IMPROVE THE EFFECTIVENESS OF THE AP/CD PROCESS.
- DEPICT THE LOGICAL AND PHYSICAL CHARACTERISTICS OF A TYPICAL AP/CD PROCESS.
- PREPARE A CONTROL MATRIX FOR A TYPICAL AP/CD PROCESS, INCLUDING AN EXPLANATION OF HOW BUSINESS PROCESS CONTROL PLANS CAN ACCOMPLISH OPERATIONS AND INFORMATION PROCESS CONTROL GOALS.

T-Mobile® USA is a nationwide wireless carrier providing voice, messaging, and high-speed wireless services to 8 million customers. As T-Mobile's business grew through acquisitions, it made more purchases and more payments to its vendors. As a result, it experienced an escalating volume of phone calls from vendors requesting payment status. To handle the increased volumes, it became imperative that T-Mobile automate its accounts payable/cash disbursement process. One solution considered by Susan Felix, the director of accounting at T-Mobile, was the electronic funds transfer (EFT) capability of its PeopleSoft ERP Accounts Payable system. Although this solution would automate the payment process, T-Mobile accounts payables clerks would still need to perform inquiries into the accounts payable system to answer vendor questions. T-Mobile's choice was the outsourced order to pay solution hosted by Xign® Corporation.[1]

Now, T-Mobile vendors, such as Nokia, Samsung, and Motorola, submit their invoices electronically to T-Mobile through the Xign Payment Services Network (XPSN). The XPSN system routes the invoices to the appropriate people at T-Mobile for approval. When T-Mobile is ready to pay the invoice, it selects the invoice for

1 Xign's order to pay process is an example of an electronic invoicing and payment (EIPP) system in the B2B environment. In Chapter 11, there is a description of electronic bill presentment and payment (EBPP) systems in the B2C environment.

payment, and the XPSN system posts the payment to the T-Mobile systems and prepares an electronic payment. At any time during this process, T-Mobile and its vendors can query the XPSN system to determine the status of invoices and payments.

T-Mobile reports that the Xign solution has lowered operating costs (e.g., T-Mobile no longer needs to enter invoices), reduced vendor inquiries (vendors use the self-service features of the XPSN system), significantly cut the number of erroneous payments (e.g., the XPSN system facilitates the matching of vendors, purchases, and receipts before a payment is authorized), improved cash management (treasury organization receives an accurate cash flow forecast and can control the precise timing of payments), simplified vendor master data maintenance (suppliers maintain their own account data), and increased the level of security and ability to audit the payment process (the XPSN maintains an audit trail on the secure XPSN server). In addition, T-Mobile suppliers receive quicker payments (payments are electronic) and additional information because information such as payment status and detailed remittance information is always available on the XPSN server.[2]

Synopsis

This chapter presents our fourth business process, the accounts payable/cash disbursements (AP/CD) process. The AP/CD process includes the last two steps, invoice verification and payment processing, in the purchase-to-pay process (see Figure 2.10 on pg. 55). After we introduce the players involved in the AP/CD process, we describe the logic and data typically employed in the process. In addition, we call your attention to the "Physical Process Description" and the "Application of the Control Framework" sections that cover state-of-the-art material on current and evolving technology.

Introduction

As previously noted, the AP/CD process comprises the last two steps in the purchase-to-pay process (Figure 2.10, pg. 55). Let's take a closer look at the AP/CD process.

Process Definition and Functions

The **accounts payable/cash disbursements (AP/CD) process** is an interacting structure of people, equipment, methods, and controls designed to accomplish the following primary functions:

- Handle the repetitive work routines of the accounts payable department and the cashier.[3]
- Support the decision needs of those who manage the accounts payable department and cashier.
- Assist in the preparation of internal and external reports.

2 "Supplier Activation Program Helps T-Mobile Transition to Order to Pay," Xign, http://www.xign.com, accessed August 29, 2006.

3 To focus our discussion, we have assumed that these two departments are the primary operating units related to the AP/CD process. For a given organization, however, the departments associated with the process may differ.

First, the AP/CD process handles the repetitive work routines of the accounts payable department and cashier by capturing and recording data related to their day-to-day operations, such as recording vendor invoices and paying those invoices. The recorded data then may be used to generate source documents (such as disbursement vouchers and vendor payments) and to produce internal and external reports.

The AP/CD process prepares a number of reports that personnel at various levels of management use. For example, the cashier might use an accounts payable aging report to plan cash availability. The cash disbursements manager might use a cash requirements forecast to help decide which invoice(s) to pay next.

Finally, the AP/CD process assists in the preparation of external financial statements. The process supplies the general ledger with data concerning various events related to the procurement activities of an organization. This data is related to accounts payable, the related expenses incurred or assets acquired, and the cash that is disbursed.

Organizational Setting

The AP/CD process is closely linked to functions and processes inside and outside the organization. Let's take a look at those links and the impact that they have on the operation of the AP/CD process.

A Horizontal Perspective

Figure 13.1 and Table 13.1 present a horizontal view of the relationship between the AP/CD process and its organizational environment. They show the various information flows generated or captured by the process. Take some time now to study the figure to get acquainted with the number of entities with which the process interacts. The data flows in Table 13.1 indicate the nature of these interactions.

Figure 13.1 and Table 13.1 reveal four information flows that function as vital communication links among the various departments, business processes, and external entities. We briefly explain each flow here to give you a quick introduction to the AP/CD process. Although Figure 13.1 depicts the flows using the document symbol, most of them can be implemented using electronic communications (e.g., *workflow*) and data stored in the enterprise database.

- Flow 1 is the invoice from a vendor.
- With flow 2, the accounts payable department notifies the general ledger that an invoice has been received and recorded. The general ledger uses this flow to update the general ledger account for accounts payable to reflect an increase in payables. This is the other half of the entry that was made when the goods were received (see Chapter 12). This entry is a credit to accounts payable, whereas the entry in Chapter 12 was a debit to inventory. A clearing account is used to balance these entries between the time that each is made.
- Flow 3a is a request from accounts payable to the cashier for a payment to be made, and flow 3b notifies the general ledger that a payment is pending (this will be matched with actual payments).
- Flow 4a is the cashier's payment to the vendor. Flow 4b notifies accounts payable that a payment has been made, so that the invoice can be closed. Flow 4c notifies the general ledger that a payment has been made. The general ledger matches this against the notice of pending payments (3b) and updates the general ledger accounts for cash, accounts payable, and discounts taken, if any.

FIGURE 13.1 A Horizontal Perspective of the AP/CD Process

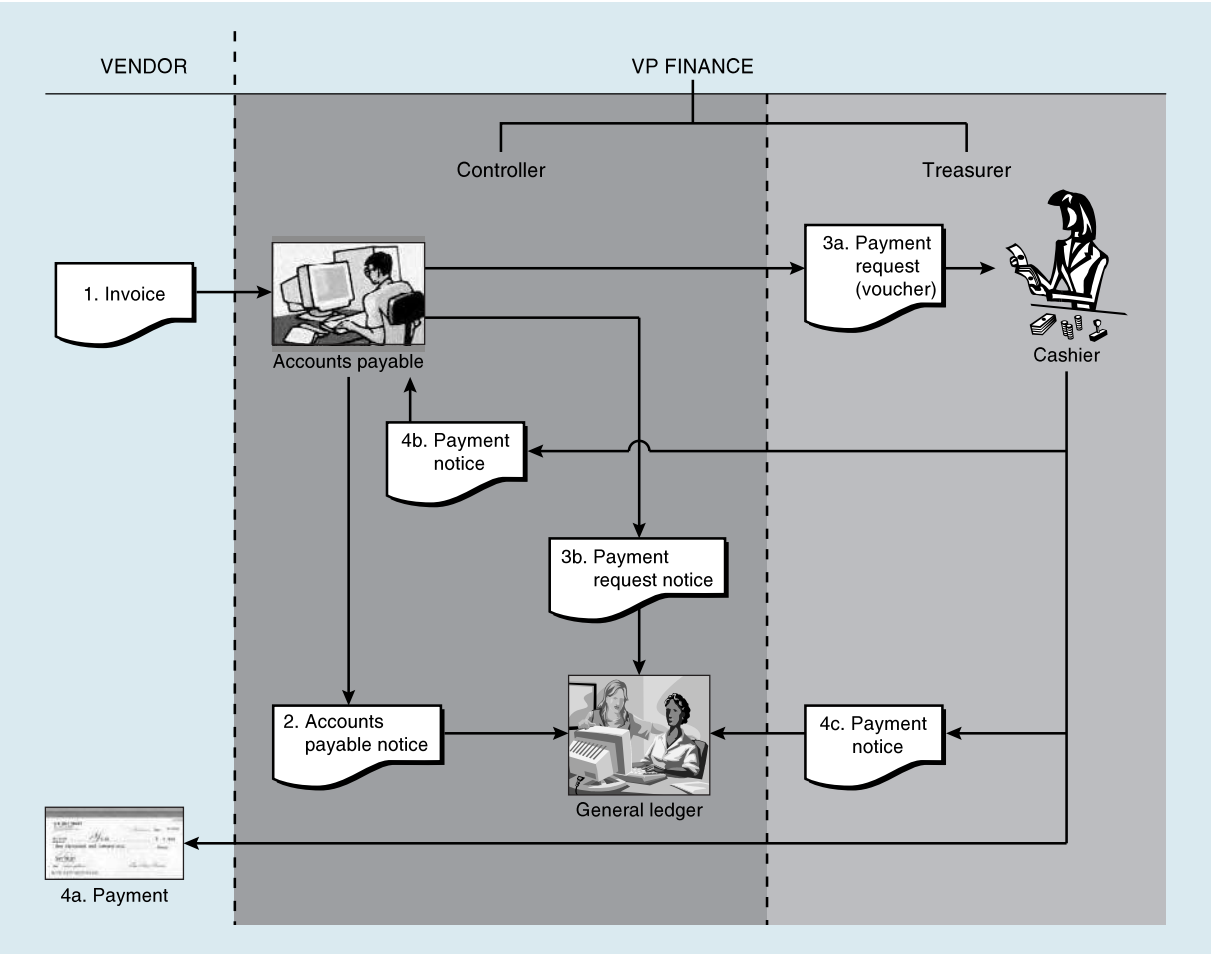


TABLE 13.1 Description of Information Flows

Flow No.	Description
1	Invoice received from vendor
2	Invoice notice sent to general ledger
3	Approved voucher (payment request) sent to cashier (3a) and to general ledger (3b)
4	Payment (e.g., check) sent to vendor by cashier (4a), paid voucher (payment notice) returned to the accounts payable department (4b), payment notice sent to the general ledger (4c)

A Vertical Perspective

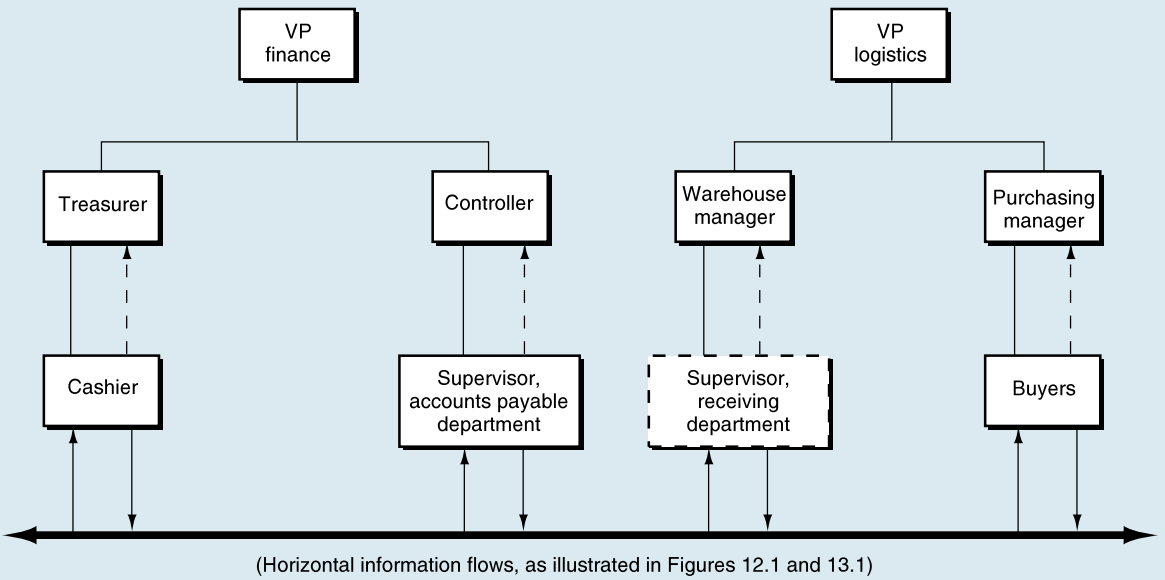
Figure 13.2 (pg. 466) presents a representative organization chart that combines the purchasing process of Chapter 12 and the AP/CD process described in this chapter. We put them together here so that we can discuss the interactions of these processes and the players involved. In Chapter 12, we introduced the functions reporting to the VP of

logistics. The new players here include the accounts payable department that is responsible for processing invoices received from vendors, preparing payment vouchers for the subsequent disbursement of cash for goods or services received, and *recording* purchase and disbursement events. The cashier has *custody* of the organization's cash and *executes* the payments *authorized* by the accounts payable department.

The relationship between these groups, logistics and finance, are very similar to the relationships among the marketing, logistics, and finance functions described in Chapters 10 and 11. For example, we see processes such as order entry and shipping that begin a larger process—order-to-cash—working in conjunction with processes such as billing and cash receipts, which complete the larger process. In Figure 13.2, we represent the functions that start the purchase-to-pay process, purchasing and receiving, and the functions that complete the process, accounts payable and the cashier.

In addition to cooperating in completing these larger processes, these functions and the processes for which they are responsible share data with which the processes operate on a day-to-day basis and make important management decisions. For example, the warehouse manager uses purchasing data to schedule personnel to handle incoming shipments and provide storage space for the goods to be received. The controller uses the purchasing and receiving data to validate incoming vendor invoices. The treasurer uses purchasing data to ensure that funds will be available to meet future obligations. Finally, data also is used "up stream" (i.e., left to right in Figure 13.2). For example, purchasing supervisors may use data about available funds to schedule purchases.

FIGURE 13.2 A Vertical Perspective of the Purchasing and AP/CD Processes



NOTES:

1. This figure represents a partial organization chart for the finance and logistics functions.
2. The broken lines represent vertical information flows (often in the form of management reports) based on data captured or generated by the purchasing and AP/CD processes.

Logical Process Description

This section expands on the AP/CD process. Once again, logical DFDs are used to present the basic composition of a typical process. The section includes a brief discussion of the processing of noninvoiced disbursements. We also describe and illustrate the process's major data stores.[4]

Discussion and Illustration

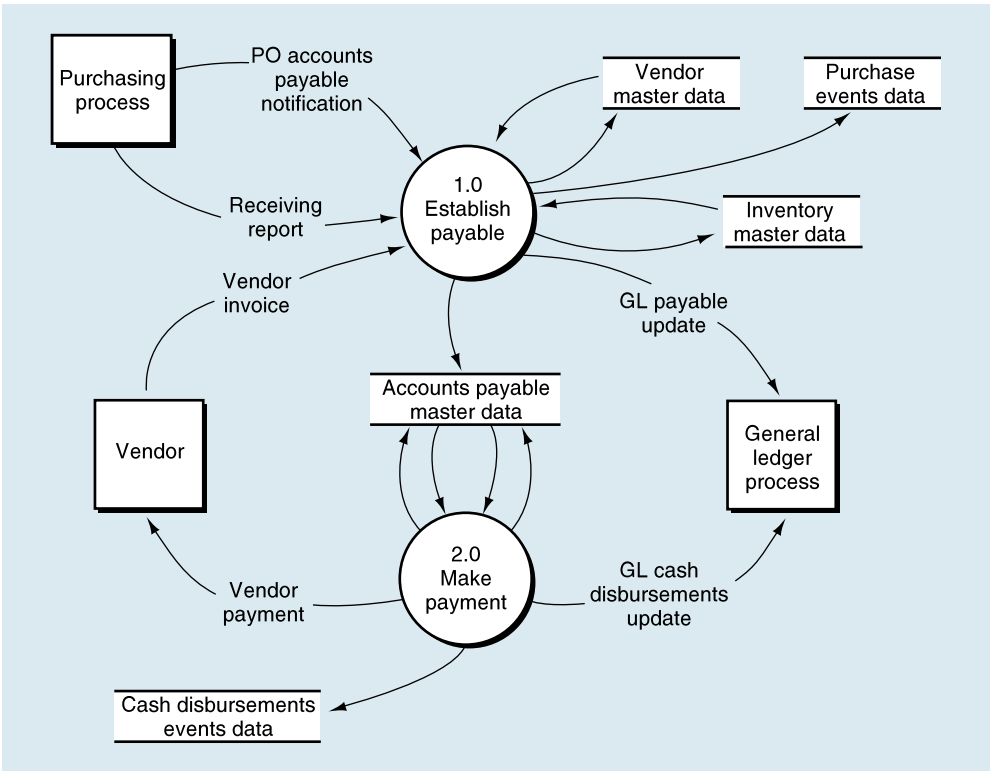
Figure 13.3 reflects the level 0 DFD for a typical AP/CD process. Take some time to study the figure. To focus our discussion, we have assumed that the AP/CD process performs two major processes, represented by the two bubbles in the DFD. The next two sections describe the processes within those two bubbles.

Establish Payable

CONTROLS

Figure 13.4 (pg. 468) presents a DFD for establishing accounts payable.[5] As shown by bubble 1.1, the first step in establishing the payable involves validating the vendor invoice. This process is triggered by receipt of the **vendor invoice**, a business document that notifies the purchaser of an obligation to pay the vendor for goods (or services) that were ordered by and shipped to the purchaser. Figure 11.5 in Chapter 11 (pg. 386)

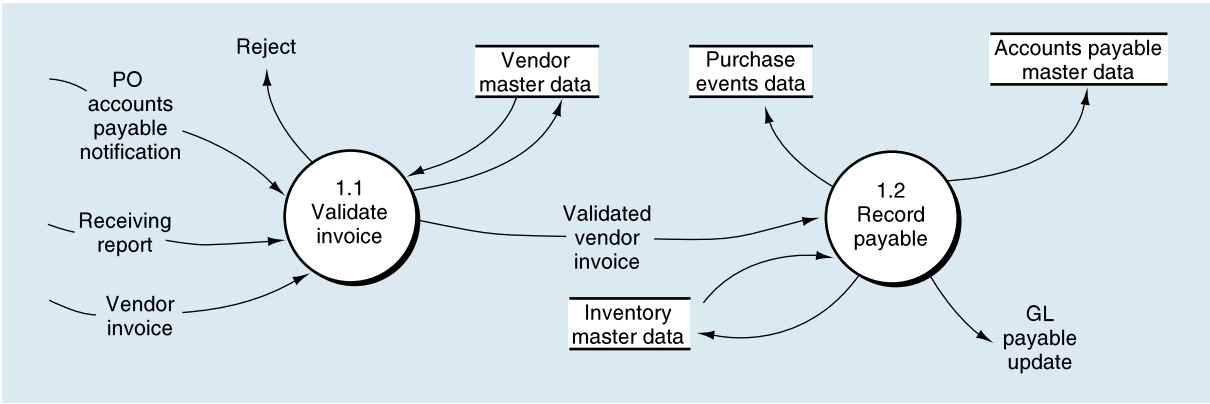
FIGURE 13.3 The AP/CD Process—Level 0 Diagram



4 As we have in several earlier chapters, we remind you once again that the data stores in the logical DFDs might well be the AP/CD process's view of an *enterprise database*.

5 This process is also known as invoice verification or invoice matching.

FIGURE 13.4 AP/CD Process—Diagram 1



depicts a typical invoice screen. Process 1.1 comprises a number of steps. First, the vendor invoice is matched against vendor master data to determine that the invoice is from an authorized vendor. Next, the vendor invoice is compared against the purchase order data (see the flow PO accounts payable notification) to make sure that there is a PO (i.e., the purchase has been *authorized*) and that the invoiced items, quantities, and prices conform to the purchase order. Then, the invoice is matched against the receiving report data to determine that the items and quantities have been received.[6] These line-by-line comparisons among the vendor invoice, PO (PO accounts payable notification) and receiving report are known as a three-way match, an important control in the AP process by which data from the purchasing process is used to *authorize* the recording of the invoice. Finally, the invoice is checked for accuracy of terms, computed discounts, extensions, and total amount due. Note that the vendor master data is updated at this point to reflect purchase history data.

If the data items do not agree (e.g., items, quantities, or prices are wrong), the invoice is rejected and follow-up procedures are initiated (see the reject stub emanating from bubble 1.1). If the data items agree, the invoice is approved, and the validated invoice is sent on to the next step to be used to record the payable.

ENTERPRISE SYSTEMS

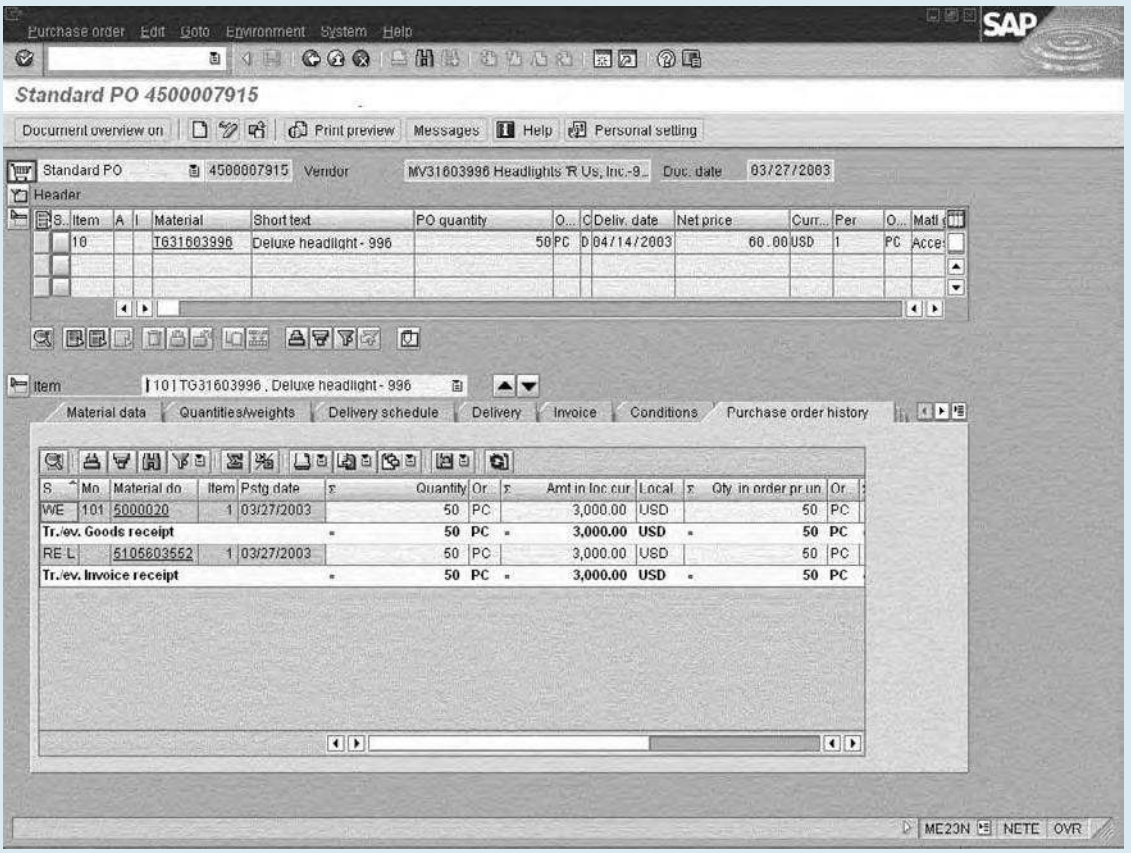
Figure 13.5 depicts the purchase order and related data that can be displayed in the SAP® R/3 system. At the top of this display is the purchase order data. We can drill down here to find the related purchase requisition. At the bottom of the screen, you can see the purchase order history, including the goods receipt and the invoice. Before the invoice was accepted, a match was performed (i.e., invoice verification) to determine that the purchase order, goods receipt, and invoice matched (within tolerances chosen by the user).

Bubble 1.2 in Figure 13.4 depicts the process of recording the payable in the purchase events data and accounts payable master data. A payable is recognized and recorded by:

- Creating a record in the purchase events data store. This record includes details on the general ledger accounts to be updated, including accounts payable, freight, and sales tax, unless these latter two items are to be added to the cost of the acquired asset. If the vendor invoice is for other than the purchase of inventory, these general ledger accounts could also include assets, such as fixed assets, and expenses.

6 Rather than flows from the purchasing process, the PO accounts payable notification data and receiving data are probably obtained from the PO master data and the purchase receipts data that were updated as POs were created and goods received.

FIGURE 13.5 Sample SAP Purchase Order Data Screen



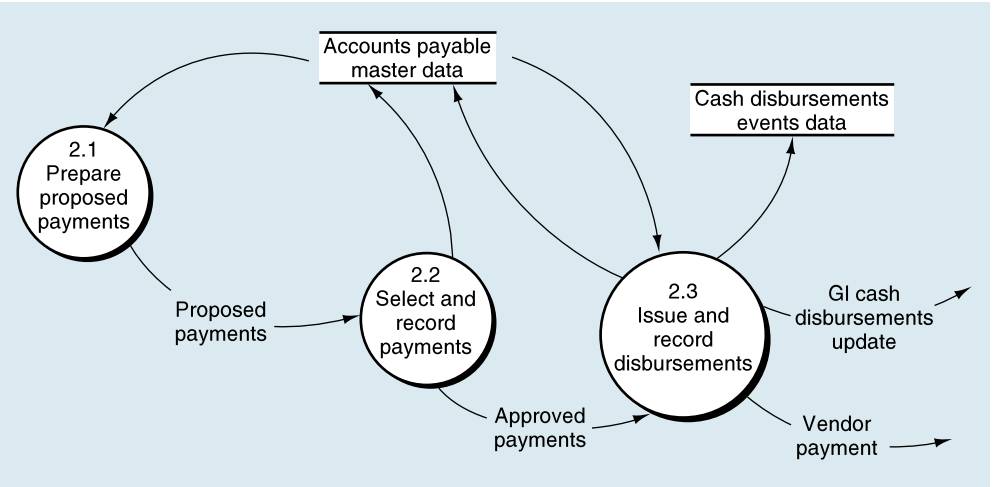
Source: Reprinted with permission from SAP. Copyright SAP AG.

- Creating a record in the accounts payable master data to reflect an open invoice—a payment due to a vendor.
- Updating the inventory master data for the cost of the items received. The update to inventory when the goods were received might have been a standard cost or the cost from the purchase order. Differences among the PO, standard, and actual costs would be accounted for as standard cost variances.
- Notifying the general ledger of the amount of the payable that was recorded (see the data flow "GL payable update"). If the update to the general ledger is periodic, the data for this update would come from a summary of the purchase events data store rather than from the recording of each vendor invoice. To balance the credits to accounts payable for the purchase of inventory, a debit is made to the clearing account that was credited at the time the inventory was received. Balances in this clearing account reflect matching invoices or receipts that have not been recorded.

Make Payment

Figure 13.6 presents a DFD of the cash disbursements process. We remind you as you study the figure, that the payment process is *triggered* by payment due-date information residing on the accounts payable master data.

FIGURE 13.6 AP/CD Process—Diagram 2



As you can see, the payment process begins with the preparation of a list of payments that might be made at this time (bubble 2.1). The selection of items for this list is based on payment due dates and terms that may indicate a discount can be taken for a payment at this time. The proposed list is reviewed and amended (bubble 2.2) to add additional invoices that are not due for payment yet but that can be consolidated with other payments being made to a vendor. Proposed payments may be removed from the list if there are insufficient funds or if payments to a vendor are on hold.

Bubble 2.3 in Figure 13.6 depicts the process of preparing the payment, equal to the amount of the invoice less any discount taken. The payment is recorded by:

- Marking the invoice as paid on the accounts payable master data.
- Making an entry in the cash disbursements event data store.
- Sending payment data to the general ledger where an entry is made to reflect the payment (cash, accounts payable, discount taken, etc.). If the update to the general ledger is periodic, the data for this update would come from a summary of the cash disbursements events data store rather than from the recording of each vendor payment.

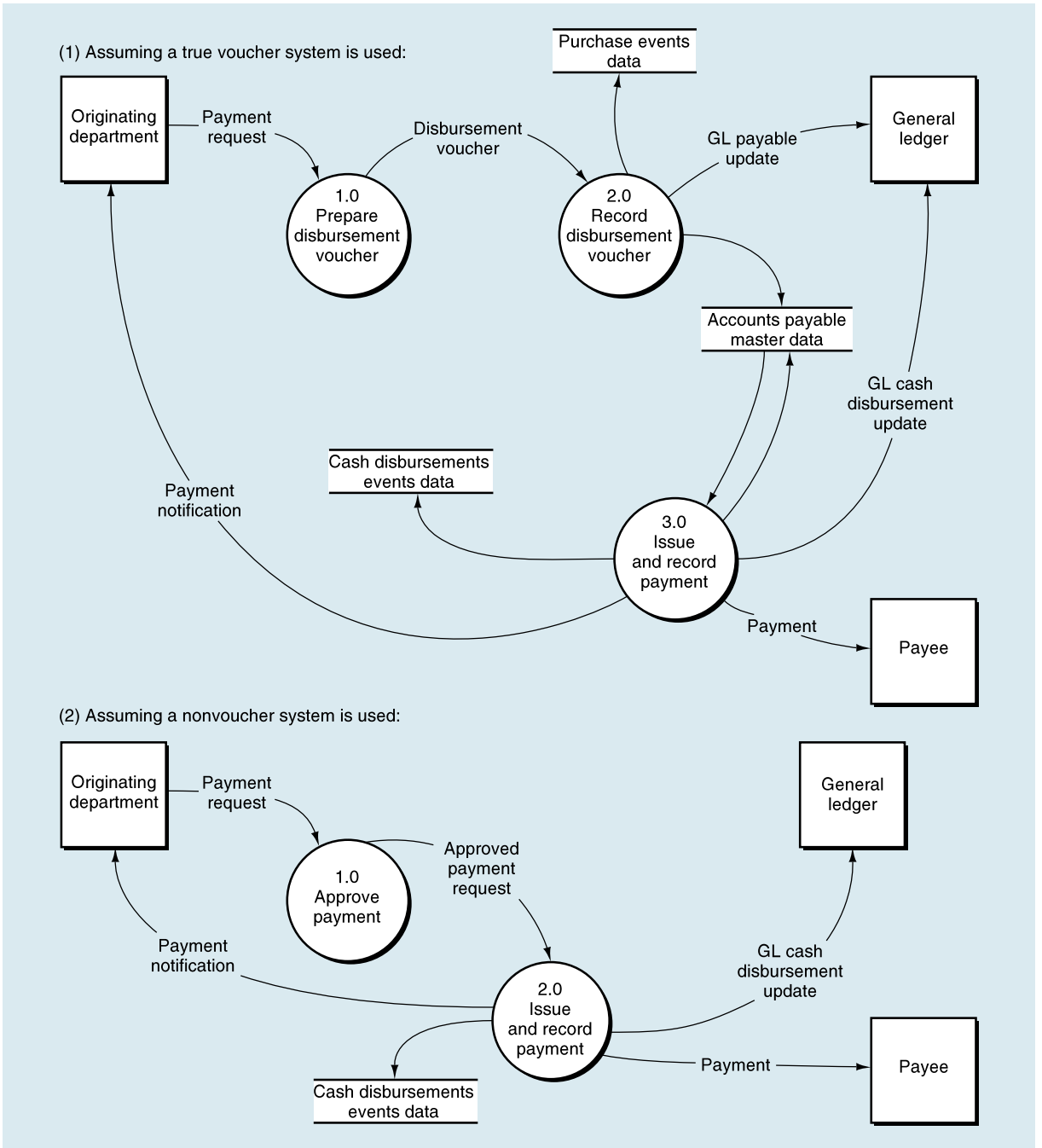
CONTROLS

The payment schedule adopted depends on the availability of any favorable discounts for prompt payment and on the organization's current cash position. Some companies will pay multiple invoices with one check to minimize the cost of processing invoices. Most cash managers will attempt to optimize cash balances to help achieve another operations process (effectiveness) goal: *to ensure that the amount of cash maintained in demand deposit accounts is sufficient (but not excessive) to satisfy expected cash disbursements.* To accomplish this goal, many banks offer their commercial customers a cash-management service by which the bank transfers from the customer's money market or other investment account into its checking account the exact amount needed to cover the checks that clear each day.

Processing Noninvoiced Disbursements

Figures 13.4 (pg. 468) and 13.6 demonstrate only those events for which an invoice is received from the vendor for purchases of *goods* or *services*. But what about disbursements that are not typically supported by invoices, such as for payroll, payroll taxes, corporate

FIGURE 13.7 Processing Noninvoiced Disbursements



income taxes, rent, security investments, repayment of debt obligations and interest, and the like? In this section, we examine how such noninvoiced disbursements are processed.

Figure 13.7 is a logical DFD that shows the processing of noninvoiced payments under two different assumptions: (1) a true *voucher process* is used in which all expenditures must be vouchered—that is, formally recorded as a payable—before they can be paid, and (2) a nonvoucher process is employed.

As you can see in Figure 13.7, the trigger for either process is a payment request from an originating department. The originator might be the treasurer in the case of payments for investment or financing activities, the controller's department in the case of tax payments, or even an accounts payable software module for recurring monthly payments such as rent. Upon receipt of the payment request, the processing in the voucher versus nonvoucher process varies primarily in the formality of the approval process. In the voucher process shown in part (1) of the figure, all payments for whatever purpose and no matter how small (even petty cash reimbursements) are formally approved—that is, "vouchered"—in process 1.0. In process 1.0, the proper account distribution also is added to the disbursement voucher. All vouchered items are then recorded as payables (see process 2.0) before they are paid. This means that from an accounting standpoint, the distribution of charges to asset, expense, or other accounts is reported to the general ledger by process 2.0 (immediately or periodically via a summary of the purchase events data store); in process 4.0, the general ledger is notified to eliminate the payable and reduce the cash account (immediately or periodically via a summary of the cash disbursements event data).

In the nonvoucher process depicted in part (2) of Figure 13.7, the payment request also is approved in bubble 1.0, and the account distribution is added to the request. However, the approval process is less formal than in the voucher process—no disbursement voucher is prepared. Physically, the approved payment request that is passed to process 2.0 usually would comprise the same document that entered process 1.0 but with authorized signatures and account distribution now appended. In this process, the payment is issued and recorded in the cash disbursements event data, and the general ledger is notified (immediately or periodically via a summary of the cash disbursements event data) to reduce the cash account and record the distribution of accounting charges (e.g., expenses).

Logical Data Descriptions

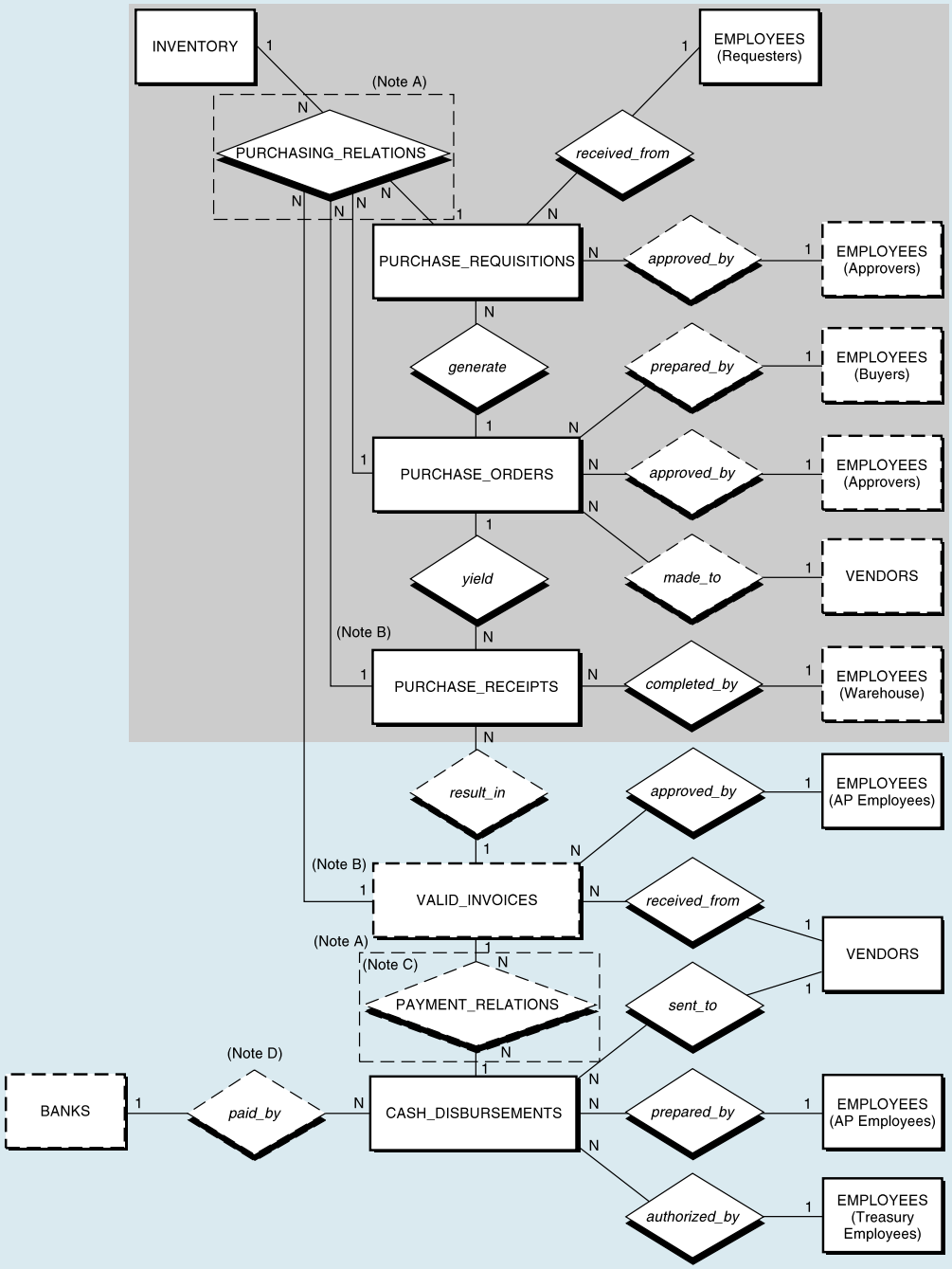
The AP/CD process entails several data stores. The *inventory master data*, *vendor master data*, *purchase requisitions master data*, *purchase order master data*, and *purchase receipts data* were described in Chapter 12. The following are three additional data stores:

- **Purchasing events data** contains, in chronological sequence, the details of each invoice that is recorded. Each record shows the date recorded; vendor invoice number; account distributions, such as assets, expenses, freight, sales tax (or the clearing account for inventory receipts); and gross invoice amount.
- **Accounts payable master data** is a repository of all unpaid vendor invoices. The data includes vendor number, vendor invoice number and date, terms, date due, line item details (items, quantities, cost), and invoice total.
- **Cash disbursements events data** contains, in chronological sequence, the details of each cash payment made. Accordingly, each record in this data store shows the payment date, vendor identification, disbursement voucher number (if a voucher process is used), vendor invoice number(s) and gross invoice amount(s), cash discount(s) taken on each invoice, net invoice amount(s), check amount, and check number.

Logical Database Design

As in the prior three chapters, this section focuses on a *database approach* to data management. On the bottom portion of Figure 13.8, we portray the data model for the AP/CD process in an *entity-relationship (E-R) diagram*. We also show (shaded) the entities

FIGURE 13.8 Entity-Relationship (E-R) Diagram (*Partial*) for the AP/CD Process



NOTES, for simplicity, we assume that:
A—See page 474 for an explanation of the box around PURCHASING_RELATIONS. See page 474 for an explanation of the box around PAYMENT_RELATIONS and why the model is not fully normalized.
B—There are no partial receipts of any line item on a PO or partial invoicing of any line item on a receipt.
C—The difference between VALID_INVOICES and CASH_DISBURSEMENTS represents accounts payable and/or deferred charges.
D—A nonvoucher system is used and a single cash disbursement could pay for several vendor invoices, but there are no partial payments (each line item and each invoice are paid in full).

and relationships from Chapter 12 because these two chapters are interrelated from a database design perspective.

In examining the figure, you'll notice that the *events* of validating invoices and disbursing cash are depicted by two entity boxes (VALID_INVOICES and CASH_DISBURSEMENTS). The E-R diagram reflects how these events relate to prior events (PURCHASE_REQUISITIONS, PURCHASE_ORDERS, and PURCHASE_RECEIPTS), agents (EMPLOYEES and VENDORS), and *resources* (INVENTORY and BANKS). To simplify the figure, we have done the following:

- Assumed that all purchase orders are for merchandise inventory items (i.e., purchases of other goods and services are ignored)
- Assumed that a nonvoucher process is employed

As in its counterpart in Chapter 11 (see Figure 11.9 on pg. 392), Figure 13.8 shows that there is no need for a separate entity for accounts payable. Rather, accounts payable balances at any point in time—or their counterpart, deferred charges—are computed as the difference between the continuous events, VALID_INVOICES and CASH_DISBURSEMENTS.

Also carried over from Figure 12.10 (pg. 437) in Chapter 12 is the relationship PURCHASING_RELATIONS. As it was in Figure 12.10, this relationship accumulates a record of events as they progress. In this case, we add the VALID_INVOICES event (i.e., receipt and recording of the vendor invoice) to this relationship. Recall from Figure 12.10 that this relationship already has accumulated a record of the PURCHASE_REQUISITIONS, PURCHASE_ORDERS, and PURCHASE_RECEIPTS. The box around this relationship indicates that we will have a relation in our database for this relationship, whereas the other relationships will not have a corresponding relation.

As with Figures 10.9 (pg. 348), 11.9 (pg. 392), and 12.10 (pg. 437), the model in Figure 13.8 is not fully normalized yet. We include the "extra" relationships and redundant attributes to help you see the logical sequence of events. Also, the notes on Figure 13.8 indicate that this is a simplified model. Certainly, realistic models must deal with partial receipts, invoices, and payments.

From Figure 13.8, we developed the relational tables shown in Figure 13.9 (pgs. 475–476). As with the E-R diagram, many of the relational tables are the same as shown in Chapter 12 (Figure 12.11, pg. 438) because these two chapters are tightly integrated from a database perspective. We repeat here from Figure 12.11 all but the last three relations shown in Figure 13.9 to emphasize the connections (linkages) among relations and to remind you that before making a cash disbursement, we have requisitioned the goods (or services), sent a purchase order to a vendor, received the goods, and received the vendor invoice. Also note that the relations in Figure 13.9 are not dissimilar to those shown in Figure 10.9 (pg. 348) (e.g., VENDORS is similar to CUSTOMERS, PURCHASE_ORDERS resembles SALES_ORDERS, and so forth).

Finally, we should note that the primary key of the relationship PAYMENT_RELATIONS is a composite key comprised of the invoice number (from VALID_INVOICES) and the cash disbursement number (from CASH_DISBURSEMENTS). This relationship matches the invoices with the disbursements and allows us to easily obtain the total amount of each disbursement. The box around this relationship indicates that we will have a relation in our database for this relationship, whereas the other relationships will not have a corresponding relation.

FIGURE 13.9 Selected Relational Tables (*Partial*) for the AP/CD Process

Shaded_Attribute(s) = Primary Key

INVENTORY

Item_No	Item_Name	Price	Location	Qty_on_Hand	Reorder_Pt
936	Machine Plates	39.50	Macomb	1,500	950
1001	Gaskets	9.50	Macomb	10,002	3,500
1010	Crank Shafts	115.00	Tampa	952	500
1025	Manifolds	45.00	Tampa	402	400

EMPLOYEES

Emp_No	Emp_First_Name	Emp_Last_Name	Soc_Sec_No	Emp_Dept
B432	Carl	Mast	125-87-8090	492-01
A491	Janet	Kopp	127-93-3453	639-04
A632	Greg	Bazie	350-97-9030	538-22
B011	Christy	Kinman	123-78-0097	298-12

VENDORS

Vend_No	Vend_Name	Vend_Street	Vend_City	Vend_ State	Vend_ ZIP	Vend_Tel	Vend_ Contact	Credit_ Terms	FOB_Terms
539	Ace Widget Co.	190 Shore Dr.	Charleston	SC	29915	803-995-3764	S. Emerson	2/10,n/30	Ship Pt
540	Babcock Supply Co.	22 Ribaut Rd.	Beaufort	SC	29902	803-552-4788	Frank Roy	n/60	Destin
541	Webster Steel Corp.	49 Abercorn St.	Savannah	GA	30901	912-433-1750	Wilbur Cox	2/10,n/30	Ship Pt

PURCHASE_REQUISITIONS

PR_No	PR_Date	Emp_No (PR_Requestor)[a]	Emp_No (PR_Approver)[b]	PO_No
53948	20071215	A491	E745	4346
53949	20071215	C457	A632	4350
53950	20071216	9999	540-32	4347
53951	20071216	F494	D548	4352

PURCHASE_ORDERS

PO_No	PO_Date	Vend_No	Ship_Via	Emp_No (Buyer)	Emp_No (PO_Approver)	PO_Status
4345	20071218	539	Best Way	F395	F349	Open
4346	20071220	541	FedEx	C932	F349	Sent
4347	20071222	562	UPS	E049	D932	Acknowledged

PURCHASE_RECEIPTS

Rec_No	Rec_Date	Emp_No (Receiving)	PO_No	Invoice_No
42944	20071216	B260	4322	7-945
42945	20071216	B260	4339	9542-4
42946	20071216	B260	4345	535

FIGURE 13.9 Selected Relational Tables (*Partial*) for the AP/CD Process (*continued*)

VALID_INVOICES

Invoice_No	Invoice_Date	Vend_No	Emp_No (AP)
4388	20071224	524	G232
92360	20071223	572	G232
535	20071224	539	D923

PURCHASE_RELATIONS

PR_No	Item_No	Qty_Requested	PO_No	Qty_Ordered	Rec_No	Qty_Received	Inv_No	Qty_Invoiced	Amt_Invoiced
53947	1005	200	4345	200	42946	200	535	200	1200.00
53947	1006	50	4345	50	42946	50	535	50	212.50
53947	1015	25	4345	25	42946	25	535	25	418.75

CASH_DISBURSEMENTS

CD_No	CD_Date	Emp_No (AP)	Emp_No (Treasury)	Amount	Vend_No	Bank
9561	20080102	H263	M0513	1782.10	524	2239
9562	20080102	H263	M513	432.50	572	2240
9563	20080102	H263	E219	1831.25	539	2239

BANKS

Bank_No	Bank_Name
2239	Acme
2240	Benton

PAYMENT_RELATIONS

Invoice_No	CD_No	Amount
4388	9561	1782.10
92360	9562	432.50
535	9563	1831.25

[a] If automatic purchase requisition, then 9999; if employee, then employee number.

[b] If automatic purchase requisition, then contract number of trading partner; if employee, then employee number.

Technology Trends and Developments

Information technology has fueled significant increases in productivity in accounts payable departments. A recent survey of accounts payable professionals found that four of their top-five priorities included improved efficiency and cost reduction through the use of information technologies.[7] In this section, we explore e-invoicing, the processing of invoices in electronic form, and e-payments, the electronic submission of payments. These two technology categories have spurred the AP/CD productivity gains.

E-invoicing is accomplished in one of three ways. First, an accounts payable office *scans* paper invoices upon receipt from the vendors. The *digital images* of the invoices can then be routed for processing and approval using *workflow* processes. To create a payable on the system, however, the *data* from these scanned invoices must either be typed into the accounts payable system or read using *OCR*. Nonstandard formats on the invoices can lead to errors in the input data. This is not unlike the problem experienced in recording *remittance advices* (RA) in the cash receipts process (unless, of course, the RA is a *turnaround document* that would have a standard format). Second, an organization can use purchasing cards, or p-cards, to make purchases. In this way, several small purchases that would otherwise lead to individual invoices are consolidated onto one credit card bill. This reduces the number of invoices by as much as 20 percent and the costs associated with entering and approving those invoices for payment. Third, vendors can submit invoices electronically in either *EDI* or *XML* formats. These invoices may be submitted using VANs or the Internet. Upon receipt, they are fed directly into the accounts payable system (i.e., no manual entry is required).

To recognize the savings that can accrue from reducing the number of invoices, some organizations have eliminated invoices altogether! **Evaluated receipt settlement (ERS)** is a process by which an organization pays for a purchase on the basis of the goods receipt. Upon receipt of the goods, the AP/CD system compares the received quantity to the open purchase quantity and, if appropriate, makes a payment based on the price and terms on the purchase order. ERS arrangements would only be made with vendors who have proven records for quality and reliability. When established, ERS can reduce the costs associated with entering invoices, matching the invoice with the PO and receiving report, and resolving discrepancies between the invoice and the PO and goods receipt.

E-payments technologies eliminate the paper checks that still account for 75–80 percent of all business payments in the United States. E-payments can reduce the cost of paying an invoice from $1.50 for paper payments to 10¢ for electronic payments. EDI and XML-based technologies are typically employed to make payments. These payments are settled through the ACH network, by wire transfer, or by credit card. Technology Summary 13.1 (pg. 478) describes the use of EDI in the AP/CD processes, and Technology Summary 13.2 (pg. 478) describes electronic invoice presentment and payment (EIPP), a technology comparable to *EBPP* that is applied in B2B environments.

As noted in the story at the start of this chapter, Xign Corporation offers an EBPP-type system that is used by many organizations to automate their purchasing, accounts payable, and cash disbursements processes. Technology Application 13.1 (pg. 479) explains the Xign Order to Pay system and the control techniques that it incorporates.

CONTROLS

E-BUSINESS

7 The top-five priorities were 1) improve accuracy, controls, and compliance; 2) install/increase electronic payments; 3) improve efficiency and timeliness of processes; 4) install/increase electronic invoicing; and 5) reduce costs. "AP Pros Reveal Latest Department Strategies, Benchmarks and Advice on Hot Issues," *IOMA's Report on Managing Accounts Payable*, May 2006, Vol. 2006, Iss. 5, p. 1.

Technology Summary 13.1

USES OF ELECTRONIC DATA INTERCHANGE FOR THE AP/CD PROCESS

EDI can be adopted in most any business process, but it is prevalent in AP/CD processes where cost savings can be significant, and buyers can dictate its use with their vendors. Although often considered a dying technology, EDI continues to find favor among a number of organizations. One bank, for example, reported that the EDI payments that they cleared increased by 20 percent in one year.[a]

Briefly, with EDI, the AP/CD process works as follows. An organization's purchasing system prepares a purchase order and sends it to a vendor via EDI. At the vendor organization, the purchase order is automatically recorded in its order entry/sales system. As the order is being processed, the vendor may send an advanced shipping notice (ASN) notifying the customer that the goods are, or soon will be, in transit. After the goods have been shipped, the vendor's billing system creates an invoice and sends it to the customer via EDI. At the customer organization, the invoice is automatically recorded in its accounts payable system. When it is time to pay the invoice, the customer/paying organization prepares an EDI payment directing their bank to pay the vendor. At the same time, the customer/paying organization sends remittance information to the vendor via EDI. All of the translation and formatting required for these automated connections is performed by the EDI systems at each organization (or by VANs).

Both organizations benefit from the improved accuracy and reduced costs associated with the automatic entry of data. Delays and lost documents are reduced or eliminated for all business events, including the purchase, shipment, invoice, and payment.

[a] Steve Bills, "Electronic Payment Showing Good Signs in B-to-B Market," *American Banker*, March 10, 2005, Vol. 170, Iss. 47, p. 12.

Technology Summary 13.2

ELECTRONIC INVOICE PRESENTMENT AND PAYMENT (EIPP) SYSTEMS

Electronic invoice presentment and payment (EIPP) systems are B2B systems that combine e-invoicing and e-payment processes to send invoices to customers via a Web portal or secure network using a third-party service provider and to receive electronic payments that are initiated by the payer, processed by the third party, and settled by the ACH network, wire transfer, or credit card company. EIPP is applied in B2B environments where the payer can typically dictate the invoicing and payment methods to be used. To implement an EIPP system, business partners usually need to change their internal business processes (e.g., approval processes for invoices and payments) and integrate their legacy accounts payable and cash disbursement systems with the systems of the third-party provider.

For accounts payable departments, cost savings come in the form of reduced staff, paper, and postage. The staff costs include elimination of data entry and reduced time spent negotiating billing disputes and handling vendor queries regarding invoice approvals and payment schedules. For example, vendors can examine the central repository of invoice and payment data, maintained at the Web portal by the third-party service provider, to receive answers to most of their questions. Also, electronic invoices can be recorded with fewer errors, reconciled with purchase orders and receipts automatically, and routed for approval more efficiently. A disadvantage to the payer is the elimination of *float*. Thus, buying organizations are motivated to adopt e-invoicing but not necessarily e-payments.

Physical Process Description

E-Business

Enterprise Systems

The physical model of the AP/CD process presented in this section employs an *enterprise system*, *electronic payments*, and *data communications* technology. As with the purchasing process, this process is not completely *paperless*, but hard copy documents are held to a minimum.

TECHNOLOGY APPLICATION 13.1

XIGN'S ORDER TO PAY PROCESS

Many companies, including Charles Schwab & Company, Sprint®, T-Mobile, Verizon Wireless, Bristol-Myers Squibb Company, Payless ShoeSource®, and Armstrong® World Industries, use the Order to Pay process hosted by Xign Corporation for their purchasing, accounts payable, and cash disbursements process. Companies using the Xign system report operational savings of millions of dollars each year, in addition to savings that come from capturing early payment discounts.

The Xign Order to Pay system is called the Xign Payment Services Network (XPSN). The XPSN system operates as follows. The buying organization creates purchase orders as it normally would and sends them electronically to a Xign ''enterprise adapter'' where they are translated into the XPSN format. The electronic POs are then sent over the Internet to the XPSN server. The POs are recorded on the Xign server, and an e-mail is sent to notify the selling organization (i.e., the vendor) that a PO has been issued. The vendor logs on to the Xign server using a standard Web browser and reads and acts on the PO (each vendor can only see POs intended for that specific vendor). A selling organization can contract with Xign to have this PO data automatically imported into its order entry/sales system via electronic file uploads called *e-files*. The vendor can acknowledge the PO and transmit advanced shipping notices.

When it comes time to bill the buyer, the vendor sends an invoice to the buyer in one of three ways. First, it can log on to the XPSN server and convert the PO into an invoice. As the vendor converts (or ''flips'') a PO into an invoice, it makes changes as needed, such as adding charges not included on the PO. Second, it can use an e-file to directly link its billing system with the XPSN system. Third, it can use a Web template to create an invoice.

After the invoice has been recorded on the Xign server, the XPSN system applies buyer-specified rules to validate the invoice and sends the invoice through an enterprise adapter (for translation from XPSN format) to the buyer, where it is posted automatically to the buyer's accounts payable system. Xign's electronic workflow may be used to route the invoice within the buyer organization for approval prior to posting. During this process, the vendor can query the XPSN system to determine the status of the invoice.

The buyer acts on the invoice as it normally would and makes a payment through the XPSN system (i.e., through the enterprise adapter to the XPSN server). The XPSN system processes a digitally signed and encrypted electronic payment over a secure network through the banking system using the payment method (e.g., ACH, wire transfer, credit card) selected by the vendor. Detailed remittance information is sent to the vendor in an e-file for automatic posting to its cash receipts system. The complete history of the purchase is stored on the XPSN server to facilitate research required to authorize the payment. This data is also useful to vendors wanting to determine the status of payments due to them. This data includes an audit trail of all payments, including who authorized each payment.

Savings from using the Xign Order to Pay process come from reduced manual processing, increased efficiency in routing and approval of vendor invoices, and reduced vendor calls inquiring about the status of payments. The information on the XPSN server facilitates cash planning for disbursements and cash receipts. Early payment discounts are more easily obtained because data is more accurate (e.g., the PO flip leads to accurate invoices) and payments are approved more quickly and easily. Xign estimates actual savings to be between $5.00 and $7.00 to process an invoice and issue a paper check.

Xign will assist its customers in signing up their vendors for use of the Xign system. Xign will help these vendors create their accounts on the XPSN server and prepare e-file translation routines to automatically connect their order entry and billing systems to the XPSN server. Vendors are responsible for maintaining their own data, which relieves the paying organizations of having to keep vendor data current (e.g., addresses, bank account numbers, payment methods). Xign charges payers about $1.50 to $2.00 per invoice and 75¢ to $1.00 per payment. Vendors use the service free of charge.

Sources: Xign Corporation press releases, the Xign Web site (http://www.xign.com), and interviews with Xign officers and users of the Xign system.

Discussion and Illustration

Figure 13.10 presents a systems flowchart of the process. The following paragraphs describe the flowcharted processes as well as some of the exception routines noted on the flowchart.

E-BUSINESS

Our organization's system picks up batches of the vendor's invoices at the VAN and routes them to the EDI translator. The EDI translator converts the invoices to the appropriate format and records them in the incoming invoice data. Triggered by the receipt of this batch, the accounts payable application accesses the purchase order and receiving report data and compares the items, quantities, prices, and terms on the invoices to comparable data from the PO and receiving report data. If the data correspond (within tolerances for quantities, costs, dates, etc.), a payable is created, and the general ledger is updated (accounts payable and clearing account or other account distributions such as assets and expenses).

Make Payments

E-BUSINESS

Our organization uses EDI to make the payment. Banks that are members of the National Automated Clearing House (ACH) Association combine EDI and electronic funds transfer (EFT) standards to transmit electronic payments between companies and their trading partners.

As shown in Figure 13.10, the accounts payable master data is searched periodically (e.g., daily, twice each week) for approved vendor invoices due to be paid. The cash disbursements clerk selects invoices for payment, perhaps eliminating some and adding others, and prepares batch totals. The totals include total accounts payable being paid, discounts taken, and total dollars disbursed.[8] The cash disbursements application prepares the payment order and remittance advice, updates the accounts payable master data and the general ledger for the payment, displays the payment totals (i.e., AP, discounts, cash disbursed), and sends the data to the EDI translator. The translator converts the data to the appropriate format, encrypts the message, adds a digital signature, and sends the EDI payment order and remittance advice to the VAN, for pickup by the bank. The dotted line between the batch totals and the display of the payment totals indicates that the disbursement clerk would manually reconcile the totals.

What happens next is not depicted on the flowchart. The bank debits the paying organization's account and then sends the payment order to an automated clearing house for processing. The automated clearing house sends the data to the vendor's bank, where it is automatically credited to the vendor's bank account. Finally, the vendor's bank transmits the RA and payment data to the vendor. If the electronic remittance advice does not accompany the payment order through the banking system, it would be forwarded directly (via VAN) to the supplier.[9]

Exception Routines

In the DFDs (Figures 12.9 on pg. 435, 13.4 on pg. 468, and 13.6 on pg. 470) and the systems flowcharts in Figures 12.12 (pgs. 443–444) and 13.10 (pg. 481), you see a number of reject data flows or annotations depicting the location where exceptions may occur;

8 Payments could be routed, using *workflow*, for approval to the controller, vice-presidents, or the president, depending on the amount of a payment.

9 You should be aware that using EFT to wire funds between banks and employing EDI to transmit remittance data from the payer's to the vendor's computer system do *not* necessarily go hand in hand. For instance, a company could use EFT to make payments but still rely on separate paper or electronic remittance advices to notify the vendor of the details of what is being paid.

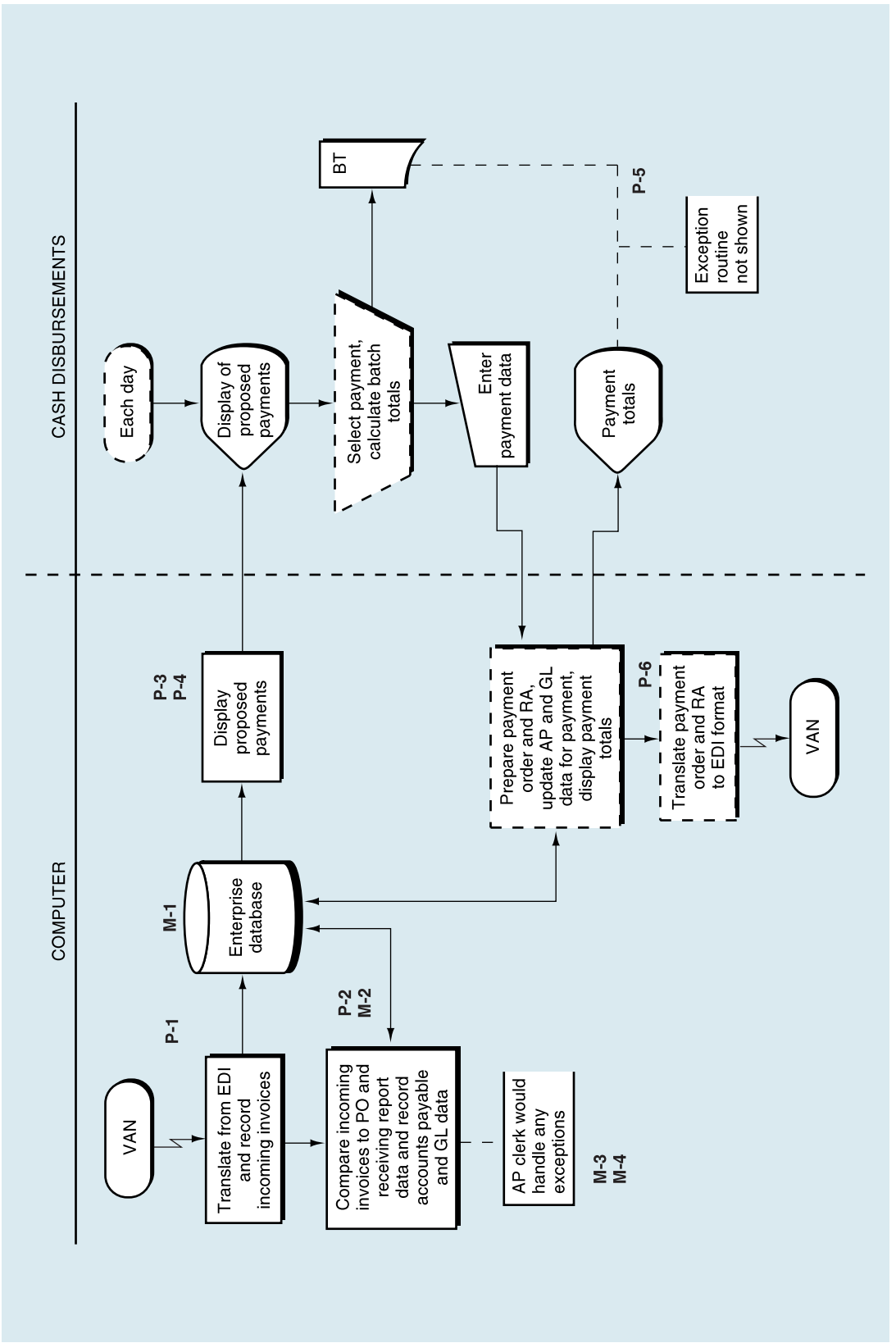


FIGURE 13.10 AP/CD Process—Systems Flowchart

these rejects and exceptions occur for a number of reasons. First, **purchase returns and allowances** frequently arise with respect to purchases. This *exception* usually occurs at the point of inspecting and counting the goods (bubble 3.1 of Figure 12.9, pg. 435, and the receiving department and computer in Figure 12.12, pgs. 443–444) or at the point of *validating* vendor invoices (bubble 1.1 of Figure 13.4, pg. 468, and in the computer column in Figure 13.10).

To initiate an adjustment for returned goods or for a price allowance in the case of otherwise nonconforming goods, someone usually prepares a *debit memorandum* and transmits it to the vendor; the vendor commonly acknowledges it by returning a *credit memorandum*. The debit memo data also is transmitted to the accounts payable department. In the case of a return, data also is made accessible to the storeroom and shipping department. The merchandise to be returned then is released from the storeroom and sent to the shipping department. There, the items to be returned are counted, recorded to the debit memorandum, and shipped. The shipping department's recording of the debit memo data also is made available to the accounts payable department.

Three other exception routines should be noted. In Figure 13.10 we see that an AP clerk would handle any exceptions discovered during the matching of incoming invoices with POs and receiving reports. As a result of a mismatch, the clerk might initiate a purchase allowance (a return would be initiated at the time of the receipt of the goods). The clerk might also have some latitude to accept nonconforming invoices, should the mismatch be within acceptable tolerances (e.g., the invoice varies by less than 1 percent). Another exception routine is noted where the cash disbursements clerk reconciles batch totals for the payments selected and the payments made. Should these totals not be the same, the clerk would need to determine if some payments were not made; some extra, unauthorized payments were made; or payments were not correct. A third exception is not noted on the flowchart. Should the payments be routed for approval, some payments might be denied and would need to be removed from the batch of selected payments before the payments were completed.

The Fraud Connection

As noted in Chapter 12, the AP/CD process is part of the *purchase-to-pay process* that culminates with the payment of cash and has a high potential for *exposing* an organization to fraud and embezzlement. In this section, we continue the Chapter 12 discussion of these abuses by presenting some of the ways the AP/CD process has been manipulated.

Fraud and the Accounts Payable Function

Abuses in this part of the AP/CD process usually entail creating phony vendors in the vendor master data and/or submitting fictitious invoices. Some examples taken from actual incidents follow:

- Stanley opened a business account at his local bank in the name of SRJ Enterprises. He deposited $100 and told the bank that the company was located at the home address of his girlfriend, Phoebe, a disgruntled colleague from his employer's accounting department. Using his home computer, Stanley printed bogus invoices in the name of SRJ Enterprises. Phoebe created a vendor record for SRJ Enterprises on the company's computer and put the bogus invoice in a stack of much larger invoices for payment and approval. This scheme continued for a year and netted over $700,000 for Stanley and Phoebe. Stanley's wife became suspicious and called the organization's internal auditor who tracked down the fraud. As first-time

offenders, Phoebe and Stanley only got probation. But, both Phoebe and Stanley's wife left him![10]

- Veronica, an accounting clerk at a dental supply wholesaler, was responsible for processing invoices for payment. One vendor, a dental appliance manufacturer, printed its invoices in black ink on plain paper. Veronica would make a copy of the invoice and process them both for payment, one a few days after the other. When the vendor recognized the duplicate payment, it sent a refund check that was sent to Veronica! She simply deposited the check in her own bank account. The scheme was discovered by a colleague who saw Veronica pocket some checks and turned her in to the organization's internal auditor.[11]

Fraud and the Cash Disbursements Function

Frauds in this category are more direct and less subtle than in the purchasing and accounts payable functions. Usually, the theft of cash entails check forgery or fraudulent wire transfers. Before the advent of computers, fraud committed via bogus corporate checks first required that the thief steal a supply of blank checks. Now, however, those checks can be counterfeited using a laser scanner, a personal computer, and a color printer. For an investment of under $1,000, the counterfeiter can set up shop.

The risk from computer-generated forgeries has escalated significantly in the past few years. Cheap color ink jet printers can now generate such perfect replicas that even counterfeiting currency has become a desktop computer operation. This is a primary reason for the U.S. Treasury's recent currency redesign, using sophisticated images and papers.

What about checks that are legitimate, made out correctly, and sent to your vendor? Will they be routed to your vendor and result in absolution of your payable? Not always. When the check gets to your vendor, an unscrupulous clerk can simply deposit the check to his or her account or use it to pay a credit card bill, or whatever. How do you prevent that? How about digitally signed electronic payments? These are either sent to the bank directly and cannot be diverted by the clerk, or if sent directly to the vendor, they cannot be altered without alerting the bank to the clerk's fraudulent change when the clerk attempts to deposit the altered check.

Nonfraudulent Losses

In Chapter 7, we cautioned you that although the subject of fraud and embezzlement is seductively interesting, resource losses due to unintentional mistakes and inadvertent errors are as costly as—or more costly than—those caused by intentional acts of malfeasance. One major source of loss is the overpayment of accounts payable that are usually caused by simple human errors, such as the following:

- *Situation 1:* Assume that we receive a freight bill (i.e., a bill for which we have no underlying purchase order against which to verify charges), and a decimal point is inadvertently "slid" one place to the right on that bill. As a result, we are billed for $4,101.30 instead of for the correct amount of $410.13. Without any purchase order to compare this bill to, we may make a payment for the incorrect, larger amount.
- *Situation 2:* Assume that we confuse a vendor's name, perhaps 3M Co. and Minnesota Mining & Manufacturing Co.. We might pay the same invoice twice, not

10 Joseph T. Wells, "Billing Schemes, Part 1: Shell Companies That Don't Deliver," *Journal of Accountancy* (July 2002): 76–79.

11 Joseph T. Wells, "Billing Schemes, Part 3: Pay-and-Return Invoicing," *Journal of Accountancy* (September 2002): 96–98.

realizing that 3M is the name of the company that once was known as Minnesota Mining & Manufacturing.

Although the latter mistake should be called to our attention by an honest vendor, the first error would have been made by the freight company and would not be caught by us. Even in cases where the overpayment is refunded to us, we have incurred the clerical cost of processing the payment, sending it to the vendor, and correcting the error after the fact.

Application of the Control Framework

In this section, we apply the control framework from Chapter 7 to the AP/CD process. Figure 13.11 presents a completed *control matrix* for the annotated systems flowchart shown in Figure 13.10 (pg. 481).

Control Goals

The control goals listed across the top of the matrix are similar to those presented in Chapters 7 and 9–12 except that they have been tailored to the specifics of the purchasing process.

The *operations process control goals* that are typical of the AP/CD process include the following:

CONTROLS

- *Effectiveness of operations:* Goals A and B identify *effectiveness goals* that are typical of the AP/CD process. Several processes must be in place to achieve goal A, *optimize cash discounts*, including processes to see that invoices are received in a timely manner, recorded promptly upon receipt, and paid within the discount period. Goal B, *ensure that the amount maintained in demand deposit accounts is sufficient (but not excessive) to satisfy cash discounts*, requires that sufficient data regarding purchases and upcoming payments is available and used to plan the availability of cash resources. For example, vendor invoices must be recorded with amounts due, dates, and terms so that the treasurer can plan for payments.
- *Efficient employment of resources*: As noted in Chapter 9 and reinforced in Chapters 10 and 11, people and computers are the resources found in most business processes.
- *Resource security:* As mentioned in Chapter 9, the resource security column should identify assets that are at risk. The resources of interest here are the cash and the accounts payable master data. Controls should protect the cash from unauthorized disbursement, fraud, and other losses. Controls should also prevent the unauthorized accessing, copying, changing, selling, or destruction of the accounts payable master data.

The *information process control goals* comprise the second category of control goals in Figure 13.11. The goals are divided into two sections—one section for vendor invoice inputs and a second section for payment inputs. The information process control goals include the following:

- *Input validity (IV):* Valid vendor invoices are those that are for goods that were actually ordered and actually received (i.e., the invoices are supported by proper purchase orders and receiving reports). Valid *payment* inputs are those that are documented by *valid*, *unpaid* vendor invoices. Note that in this case, part of ensuring validity is to prevent paying an item twice.
- *Input completeness (IC)* of vendor invoices: Failure to achieve this goal may result in lost discounts and negative relations with vendors due to late payments, and, the

FIGURE 13.11 Control Matrix for the AP/CD Process

	Control Goals of the AP/CD Business Process													
	Control Goals of the Operations Process				Control Goals of the Information Process									
	Ensure effectiveness of operations:		Ensure efficient employment of resources (people, computers)	Ensure security of resources (cash, accounts payable master data)	For vendor invoice inputs, ensure:			For accounts payable master data, ensure:		For payment inputs, ensure:			For accounts payable master data, ensure:	
Recommended Control Plans	A	B			IV	IC	IA	UC	UA	IV	IC	IA	UC	UA
Present Controls														
P-1: Independent validation of vendor invoices				P-1	P-1									
P-2: Match invoice, purchase order, and receiving report	P-2						P-2							
P-3: Tickler file of payments due	P-3		P-3								P-3			
P-4: Independent authorization to make payment				P-4						P-4				
P-5: Agreement of run-to-run totals (reconcile input-output batch totals)				P-5						P-5	P-5	P-5		
P-6: Digital signatures				P-6						P-6	P-6	P-6		
Missing Controls														
M-1 Tickler file of open purchase orders and receiving reports		M-1				M-1								
M-2: Reconcile input-output batch totals				M-2	M-2	M-2	M-2							
M-3: Cash planning report		M-3												
M-4: Reconcile bank account				M-4						M-4		M-4		

Possible effectiveness goals include the following:
A—Optimize cash discounts
B—Ensure that the amount of cash maintained in demand deposit accounts is sufficient (but not excessive) to satisfy expected cash disbursements

See Exhibit 13.1 (page 487) for a complete explanation of control plans and cell entries.

IV = input validity
IC = input completeness
IA = input accuracy
UC = update completeness
UA = update accuracy

unrecorded invoices cause liabilities to be understated. Input completeness (IC) of payment inputs may also result in lost discounts and late payments.

- *Input accuracy (IA)* of vendor invoices: Failure to achieve this goal would result in a misstatement of liabilities. Incorrect dates and terms could lead to early or late payments. Input accuracy (IA) of payment inputs may result in incorrect payments, payments to the wrong vendor, and so on.
- *Update completeness (UC) and update accuracy (UA)* of the accounts payable master data:[12] The accounts payable data must be updated properly for the vendor invoice to reflect that there is a payment due, when it is due, and the amount and terms of the payment. The data must be updated properly when a payment is made to ensure that invoices are closed to prevent duplicate payments.

Recommended Control Plans

Recall that application control plans include both those that are characteristic of a particular AIS business process and those that relate to the technology used to implement the application. We introduce you here to those new plans that are particular to the accounts payable and cash disbursements business process. We first define and explain these controls and then summarize, in Exhibit 11.1, each cell entry in Figure 13.11, the control matrix:

- **Independent validation of vendor invoices** (see Exhibit 13.1 and Figure 13.11, P-2): Authority to record a vendor invoice should come from the purchase order and receiving data created by entities other than the entity that records the vendor invoice to preclude unauthorized and invalid accounts payable records.
- **Match invoice with purchase order and receiving report** (see Exhibit 13.1 and Figure 13.11, P-3): The invoice should be matched to the purchase order and receiving report data to ensure that items on the invoice were ordered and received and that the invoice is accurately recorded.
- **Independent authorization to make payment** (see Exhibit 13.1 and Figure 13.11, P-4): To ensure that only authorized payments are made, the accounts payable records on which the payment is based should be created by an entity other than the entity that executes the payment.
- **Reconcile bank account** (see Exhibit 13.1 and Figure 13.11, M-1): Records of cash disbursements should be matched to the bank's records to ensure that all disbursements actually made by the bank were authorized and accurate. An entity other than accounts payable and cash disbursements should perform this reconciliation.

Each of the recommended control plans listed in the matrix in Figure 13.11 (pg. 485) is discussed in Exhibit 13.1 (pg. 487). We have intentionally limited the number of plans to avoid redundancy. For example, we do not include several plans from Chapter 9 such as *preformatted screens*, *online prompting*, *programmed edits* (e.g., a reasonableness test on the invoice quantity), *procedures for rejected inputs*, *confirm input acceptance*, and *populate input screens with master data*. We could also include *enter receipts data in receiving*.

Some plans are *not* listed in the control matrix nor discussed in Exhibit 13.1 because they aren't appropriate to the procedures used in the process that we are reviewing. However, you might encounter them in practice. The following are a few examples:

- Where paper documents are the basis for making disbursements, paid invoices (and the supporting purchase orders and receiving reports) are often marked "void" or

12 These update goals do not apply to this analysis because the updates are simultaneous with the inputs, and the input controls will address any update completeness and update accuracy issues.

EXHIBIT 13.1 Explanation of Cell Entries for the Control Matrix in Figure 13.11

P-1: *Independent validation of vendor invoices.*

- *Security of resources:* Because cash cannot be expended in the absence of a validated, open vendor invoice, security over the cash asset is enhanced.
- *Vendor invoice input validity:* The computerized accounts payable application, which is separate from the departments that authorized the purchase and recorded the receipt of the goods or services, actually performs the validation of the vendor invoice. Therefore, validity of the invoice should be ensured.

P-2: *Match invoice, purchase order, and receiving report.*

- *Effectiveness goal A, vendor invoice input accuracy:* The accounts payable program matches invoice items, quantities, prices, and terms to comparable data on the purchase order and receiving report data to ensure that the invoice is accurate. By recording terms accurately, we can ensure that appropriate discounts can be obtained.

P-3: *Tickler file of payments due.* The computer automatically generates a list of proposed payments.

- *Effectiveness goal A:* Action on this list should ensure that payments are made in a timely manner, not too early and not too late (i.e., to optimize cash discounts).
- *Efficient employment of resources:* The computer-generated list is more efficient than a manual scanning of open invoices.
- *Payment input completeness:* Action on this list should ensure that all payments are input.

P-4: *Independent authorization to make payment.*

- *Security of resources:* Because cash cannot be expended in the absence of a valid, open vendor invoice, security over the cash asset is enhanced.
- *Payment input validity:* Records in the accounts payable master data were created by the accounts payable process. Therefore, the data gives independent authorization to the cash disbursements computer program to approve vendor invoices for payment. The validity of payments is thereby ensured.

P-5: *Agreement of run-to-run totals (reconcile input-output batch totals).*

- *Security of resources and payment input validity:* Determining that payments input and made reflect only those authorized by the clerk ensures the cash is not disbursed inappropriately (*security of resources*) and that all inputs are *valid*.
- *Payment input completeness, payment input accuracy:* By comparing totals prepared before the input to those produced after the update, we ensure that all selected payments were authorized (*input validity),* were input (*input completeness*), and were input correctly (*input accuracy*).

P-6: *Digital signatures.*

- *Security of resources, payment input validity, payment input completeness, and payment input accuracy*: When the digital signatures are authenticated at the VAN, the VAN will know that the sender of the message has authority to send it and thus will prevent the unauthorized diversion of resources (*security of resources*). This also determines that the message itself is genuine (*validity*), whether the payment message has been altered in transit, and thus the message is *incomplete* or *inaccurate* and does not agree with the inputs and updates that took place prior to sending the payment file.

M-1: *Tickler files of open POs and receiving reports.*

- *Effectiveness goal B and vendor invoice input completeness:* Following up on open POs and receiving reports will ensure that all vendor invoices are received and input (i.e., input completeness) in a timely manner (i.e., to ensure that cash discounts can be taken).

M-2: *Agreement of run-to-run totals (reconcile input-output batch totals).*

- *Security of resources, vendor invoice input validity:* Determining that invoice inputs reflect only those received from an authorized vendor ensures the cash will not subsequently be

(*Continued*)

EXHIBIT 13.1 Explanation of Cell Entries for the Control Matrix in Figure 13.11 (*Continued*)

disbursed inappropriately (*security of resources*) and ensures the *validity* of the vendor invoice inputs.

- *Vendor invoice input validity, vendor invoice input completeness, and vendor invoice input accuracy:* By comparing totals received from the VAN (or prepared before the input) to those produced after the update, we ensure that only valid invoices were input, that all vendor invoices were input (*input completeness*), and that all invoices were input correctly (*input accuracy*).

M-3: *Cash planning report.*

- *Effectiveness goal B:* An aging of open vouchers/accounts payable records must be produced and reviewed on a regular basis to ensure that there is an adequate cash reserve to make required payments. Excess cash on hand should be invested.

M-4: *Reconcile bank account.*

- *Security of resources, payment input validity, and payment input accuracy:* Comparison of the bank's record of disbursements to those retained in the organization can detect disbursements that should not have been made (*security of resources, input validity*) or that were made incorrectly (*input accuracy*).

"paid" to prevent their being paid a second time. In paperless systems, the computerized payable records would be "flagged" with a code to indicate that they had been paid and to prevent duplicate payment.

- Where payments are by check, appropriate physical controls should exist over supplies of blank checks and signature plates that are used for check signing.
- It is not uncommon to have more than one authorized signature required on large dollar checks.
- Most companies have standing instructions with their banks not to honor checks that have been outstanding longer than a certain number of months (e.g., three months or six months).
- To prevent the alteration of (or misreading of) check amounts, many businesses use check-protection machines to imprint the check amount in a distinctive color (generally a blue and red combination).
- Vendor statements should be reviewed and compared to the accounts payable master data to ensure that invoices and payments have been accurately and completely recorded.

Turn to Exhibit 13.1, and study the explanations of the cell entries appearing in the control matrix. As you know from your studies in prior chapters, understanding how the recommended control plans relate to specific control goals is the most important aspect of applying the control framework.

Summary

This chapter has covered the AP/CD process, the fourth and fifth steps in the *purchase-to-pay process* introduced in Chapter 2. Like the process in Chapter 12, the physical process implementation presented in this chapter evidences many attributes of the paperless office of the future. In addition, technologies being employed to improve the efficiency and effectiveness of the accounts payable and cash disbursements processes were introduced. Some questions in the end-of-chapter materials ask you to consider

Technology Summary 13.3

CONSIDERING THE EFFECT OF COMPANY-LEVEL CONTROLS ON ACCOUNTS PAYABLE AND BUSINESS PROCESS CONTROLS

The effectiveness of AP/CD business process controls depends on the operation of several controls described in Chapter 8. In this summary, we examine some of those relationships.

Segregation of Duties

Several functions in the AP/CD process must be segregated for the business process controls to be effective, including the following:

- Authorization to create vendor records, as well as payment terms, should be assigned to someone other than those completing the accounts payable and cash disbursements processes. For example, vendor records might be maintained by a separate function within the purchasing department.
- The accounts payable process assumes that there has been an authorized purchase order and valid receipt. This presumes the segregation among purchasing, receiving, and accounts payable functions.
- A treasurer/cashier function separate from the controller/accounts payable function must execute payments.

Additional Manual Controls

There are several manual, pervasive and general controls that can affect the performance of the business process controls, including the following:

- One-time vendor records created to facilitate one-time payments may not receive the level of scrutiny as records for other vendors. Management must review these records to determiner that there is no abuse of this process.
- Two functions in the AP/CD process must be performed carefully by authorized, qualified personnel. These are at the point where the AP clerk handles exceptions to the three-way match and approves—or rejects—the recording of a vendor invoice and when the cash disbursements clerks selects invoices for payment while adding some and putting others on hold.
- As noted in Technology Summary 9.1 (pg. 303), the performance of manual controls depends on the quality of the people performing the control activities. Therefore, we expect controls such as *selection and hiring, training and education, job descriptions*, and *supervision* to be in place.

Automated Controls

All of the AP/CD controls performed by the computer depend on the general controls (also known as IT general controls or ITGCs) in Chapter 8. Those controls include *independent validation of vendor invoice* (e.g., check for authorized vendor and valid PO)*; match PO, invoice, and receipting report;* and *independent authorization to make payment* (e.g., check for authorized vendor and valid, unpaid invoice). We need to know that the programs will perform the controls as designed (e.g., *program change controls*). Also, we need to know that the stored data used by the computer when executing these controls is valid and accurate (e.g., physical and logical access controls). For the AP/CD process, we are particularly concerned, for example, with controlled access to the following:

- Vendor master records so that one cannot be added without authorization
- Purchase order master data and receiving report data so that bogus purchase orders and receipts cannot be created to record an unauthorized invoice
- Accounts payable master data so that bogus invoice data cannot be created that can lead to unauthorized payments

how these technologies also can help reduce the errors and frauds often found in these processes.

As we did at the end of Chapters 10 through 12, we include here, in Technology Summary 13.3, a review of the company-level controls (i.e., control environment, pervasive controls, and general/IT general controls) that may have an impact on the effectiveness of the accounts payable and cash disbursements business process controls.

Key Terms

accounts payable/cash disbursements (AP/CD) process
vendor invoice
disbursement voucher
accounts payable master data
purchasing events data
cash disbursements events data
Evaluated Receipt Settlement (ERS)
electronic invoice presentment and payment (EIPP)
purchase returns and allowances
independent validation of vendor invoices
match invoice with purchase order and receiving report
independent authorization to make payment
reconcile bank account

Review Questions

RQ 13-1 What is the AP/CD process?

RQ 13-2 What primary functions does the AP/CD process perform? Explain each function.

RQ 13-3 With what internal and external entities does the AP/CD process interact?

RQ 13-4 What are the fundamental responsibilities of the accounts payable department and the cashier?

RQ 13-5 What major *logical* processes does the AP/CD process perform? Explain each.

RQ 13-6 Describe how the processing of noninvoiced disbursements is handled in (a) a ''true'' voucher system and (b) a nonvoucher system.

RQ 13-7 What data is contained in the purchasing events data, the accounts payable master data, and the cash disbursements event data?

RQ 13-8 What are e-invoicing and e-payments?

RQ 13-9 How does EDI improve the effectiveness and efficiency of the AP/CD process?

RQ 13-10 What is EIPP? How does it improve the efficiency and effectiveness of the AP/CD process?

RQ 13-11 What are two operations process (effectiveness) goals of the AP/CD process? Provide an example illustrating each goal.

RQ 13-12 What characterizes a valid vendor invoice input? What characterizes a valid payment input?

RQ 13-13 What are the key control plans associated with the AP/CD process? Describe how each works and what it accomplishes.

RQ 13-14 Describe the impact that company-level controls (i.e., control environment, pervasive controls, and general/IT general controls) can have on the effectiveness of AP/CD business process controls.

Discussion Questions

DQ 13-1 Refer to effectiveness goals A and B shown in the control matrix in Figure 13.11 on pg. 485. For each activity (accounts payable and cash disbursements), describe goals other than the one discussed in the chapter.

DQ 13-2 Explain why ambiguities and conflicts exist among operations process (effectiveness) goals, and discuss potential ambiguities and conflicts relative to the goals you described in DQ 13-1.

DQ 13-3 Without redrawing the figures, discuss how Figures 13.3 (pg. 467), 13.4 (pg. 468), and 13.6 (pg. 470) would change as a result of the following independent situations (be specific in describing the changes):

a. Employing a voucher system that involved, among other things, establishing vouchers payable that covered several vendor invoices.

b. Making payments twice per month, on the 5th and 25th of the month, and taking advantage of all cash discounts offered.

DQ 13-4 In terms of effectiveness and efficiency of operations, as well as of meeting the generic information system control goals of validity, completeness, and accuracy, what are the arguments for and against each of the following?

a. Sending a copy of the vendor invoice to the purchasing department for approval of payment.

b. Sending a copy of the vendor invoice to the requisitioning department for approval of payment.

DQ 13-5 An electronic data interchange (EDI) system may present an organization with opportunities and risks:

a. What opportunities might an EDI system present? Discuss your answer.

b. What risks might an EDI system present? What controls and other responses might an organization choose to address these risks?

DQ 13-6 In the physical implementation depicted in Figure 13.10 (pg. 481), the computer updated the accounts payable data upon receipt of a vendor invoice (a clerk handled any exceptions). Describe the procedures that you believe should control that process.

DQ 13-7 In the physical implementation depicted in Figure 13.10 (pg. 481), the payment order and the remittance advice were sent together through the banking system. We also described an option of sending the remittance advice directly to the vendor. Which is better? Discuss.

DQ 13-8 With an EDI system, a customer's order may be entered directly into the order entry/sales system without human intervention. Discuss your control concerns under these circumstances.

DQ 13-9 In the "Fraud and the Accounts Payable Function" section, we described a fraud committed by Stanley and Phoebe and another by Veronica. For each fraud, describe controls and technology that could be used to reduce the risk of those frauds occurring.

Problems

Note: As mentioned in Chapters 10 through 12, the first few problems in the business process chapters are based on the processes of specific companies. Therefore, the problem material starts with case narratives of those processes. (The purchasing and receiving portions of these two cases are in Chapter 12.)

CASE A: Stockbridge Company (Accounts Payable and Cash Disbursements Processes)

The Stockbridge Company sells medical supplies to hospitals, clinics, and doctor's offices. Stockbridge uses an ERP system for all of its business processes. Stockbridge employs the following procedures for accounts payable and cash disbursements.

The accounts payable (AP) department receives invoices from vendors. An AP clerks enters the PO number from the invoice into the computer, and the computer displays the PO. The clerk then keys in the invoice data. The computer matches the invoice data with the data on the PO (purchase and receipt data). If there are price or quantity variances of more than 5 percent, the invoice is routed to a purchasing agent for approval. Once validated (by the computer and, if necessary, purchasing), the computer records the invoice (i.e., accounts payable) and updates the purchase order and general ledger databases.

Every morning, the accounts payable department reviews open invoices (i.e., accounts payable) to determine if they should be paid. An AP clerk selects those invoices that are to be paid, and the computer prints a check in the accounts payable department and updates the accounts payable and general ledger databases. Accounts payable mails the check to the vendor.

CASE B: Internet Payment Platform (Accounts Payable and Cash Disbursements Processes)

The following describes the accounts payable and cash disbursements processes at the U.S. Department of the Treasury's Bureau of Engraving and Printing (BEP) during a pilot of the Internet Payment Platform (IPP). Components of the IPP include a server with an "appreciating database" located at Xign, Inc. and an Intel® server at BEP called the "Enterprise Adapter." BEP's mainframe, legacy enterprise system is called BEPMIS, which has an IDMS network database.

After goods or services are provided, a supplier employee logs on to IPP for the PO "flip" (to create and record an invoice that is posted to the IPP appreciating database). IPP then sends invoices to the enterprise adapter at BEP where the invoice data are translated from XML into IDMS format for posting to the BEPMIS accounts payable database.

After invoices are posted, BEPMIS performs a three-way match of the invoice, PO, and receipt. BEP and the supplier can view these records on the IPP database and resolve disputes (e.g., disagreements regarding price or quantity listed on the invoice) as required. As the status of invoices changes, BEPMIS extracts and formats the change data, transmits these changes to the enterprise adapter for translation from IDMS format into XML. These changes are then sent to the IPP server for posting to the IPP appreciating database. The supplier can review the status of an invoice on IPP as it moves through the payment-generation process. BEP and the supplier can each drill down on IPP from the invoice to the PO.

After invoices are posted to the BEPMIS accounts payable database and payments are due, an accounts payable accountant triggers the payment process for all invoices and selects those invoices that are to be paid. BEPMIS then extracts and formats payments for participating suppliers, generates a

payment instruction file (PIF), digitally signs this (using a VeriSign® certificate), and transmits this file to the enterprise adapter for translation from IDMS format into XML. The translated file is then sent to the IPP server where it is posted to the IPP appreciating database. At the same time, a BEP accounts payable accountant manually issues an e-mail notification detailing the number of payments and total dollar amount of payments in the PIF. This notification goes to the BEP contracting officer (CO), the Financial Management Service (FMS) disbursing officer (DO) at the Regional Finance Center (RFC) in Kansas City, and the Boston Fed. The CO and DO log on to IPP to approve payment files. Optionally, an Auditor in Kansas City might also be required to approve the payment file. COs and DOs used smartcards with a thumbprint reader (a form of biometric identification) to execute these approvals, via any PC that is equipped with a Web browser and smartcard reader.

Following approvals, IPP generates an Automated Clearing House (ACH)-formatted file from the PIF and sends it to the Boston Fed. At the same time, IPP automatically sends an e-mail detailing the number of payments and total dollar amount of payments in the ACH file to the BEP accounts payable accountant, CO at BEP, DO at the RFC, and the Boston Fed. Also, IPP notifies the supplier via e-mail that a payment is coming. The ACH-formatted file is transferred to the Federal Reserve Automated Clearing House (FedACH) system, where the payment is settled by debiting the U.S. Treasury account at the Fed, crediting the accounts of the supplier's bank at the Fed, and notifying the supplier's bank of these credits. FedACH sends a Bulk Data Acknowledgement to the BEP accounts payable accountant, the CO at BEP, the DO at the RFC, and the Boston Fed detailing the number of payments and total dollar amount of those payments. The supplier's bank then credits the supplier's account.

P 13-1 For the company assigned by your instructor, complete the following requirements:

a. Prepare a table of entities and activities.

b. Draw a context diagram.

c. Draw a *physical* data flow diagram (DFD).

d. Prepare an annotated table of entities and activities. Indicate on this table the groupings, bubble numbers, and bubble titles to be used in preparing a level 0 logical DFD.

e. Draw a level 0 *logical* DFD.

P 13-2 For the company assigned by your instructor, complete the following requirements:

a. Draw a systems flowchart.

b. Prepare a control matrix, including explanations of how each recommended existing control plan helps to accomplish—or would accomplish in the case of missing plans—each related control goal. Your choice of recommended control plans could come from this chapter plus any controls from Chapters 9 through 12 that are germane to your company's process.

c. Annotate the flowchart prepared in part a to indicate the points where the control plans are being applied (codes P-1 . . . P-*n*) or the points where they could be applied but are not (codes M-1 . . . M-*n*).

P 13-3 The following is a list of 12 control plans from this chapter or from Chapters 8 through 12.

Control Plans

A. Batch sequence check

B. Restrict physical and logical access to programs, data, and documentation

C. Procedures for rejected inputs

D. Program change controls

E. Independent validation of vendor invoices

F. Independent authorization to make payment

G. Reconcile bank account

H. Security module

I. Batch control plans

J. Compare input data with master data (e.g., vendor master data)

K. Match invoice, PO, and receipt

L. Tickler file of open POs and receiving reports

The following are 10 system failures that have control implications.

System Failures

1. Acme Company was sent an invoice for goods that were never received. The invoice was paid in full.
2. Invoices are received at Tula Company via an EDI feed over the Internet. Some of these are fraudulent invoices from bogus vendors.
3. Troy, Inc. has several vendors who do not send invoices in a timely manner. Terms for payment are based on dates that goods are received, and discounts are being lost due to the late receipt, entry, and payment of these invoices.
4. Vendor invoices are sent to clerks in the AP department at Rochester, Inc. where they are entered online to create a file of invoice data that is then processed by the accounts payable program. Several errors have been found in the invoice data.
5. Ducette Company processes invoices in batches. The accounts payable program performs a three-way match of the invoice with the purchase order and receiving report. Those that match are recorded on the accounts payable master data. Those that do not match are printed on an exception and summary report. Some of these invoices are legitimate but are never recorded.
6. The accounts payable programs at Bend Company compare incoming invoices to open purchase orders and receiving reports. The reject rate is very high, so Sally the AP clerk went into the program and changed the tolerance limits so that more invoices would pass the matching process and she would have fewer rejects to correct.

7. Tenney Company ordered 15 widgets from Cummington, Inc. Only 10 widgets were received, the other 5 were on back order at Cummington. An invoice for 15 widgets was received at Tenney and was recorded and eventually paid.
8. Betty Fern, the cashier at Colchester Company, has been writing small checks to herself for many months. No one has noticed.
9. Fred Friendly, a clerk in accounts payable at Southwick Company, has a cousin who owns a small office supplies company. Fred's cousin periodically sends invoices to Fred for office supplies that Southwick never ordered or received. Fred creates a one-time vendor record and records the invoice. Once recorded as a payable, the invoice gets paid.
10. On a weekly basis, George, the cash disbursements clerk at Adams Company, prepares a batch of payments, including some to himself and sends the batch to the treasurer for approval. George has worked out a deal with Sydney who works in the treasurer's office to approve these batches, and they split these fraudulent payments.

Match the 10 system failures with a control plan that would *best* prevent the system failure from occurring. Also, give a brief (one- to two-sentence) explanation of your choice. A letter should be used only once, with 2 letters left over.

P 13-4 Note: If you were assigned DQ 13-3, consult your solution to it. Modify the DFDs in Figures 13.3 (pg. 467), 13.4 (pg. 468), and 13.6 (pg. 470), as appropriate, to reflect the following *independent* assumptions:

a. Employing a voucher system that involved, among other things, establishing vouchers payable that covered several vendor invoices
b. Making payments twice per month, on the 5th and 25th of the month, and taking advantage of all cash discounts offered

Note: Because the two assumptions are independent, your instructor may assign only one of them.

P 13-5 The following are 10 process failures that indicate weaknesses in control.

Process Failures

1. A vendor invoice was posted to the wrong record in the accounts payable master data because the data entry clerk transposed digits in the vendor identification number.
2. Several scanned invoice documents were lost and did not get recorded.
3. The amount of a cash disbursement event was erroneous, resulting in the balance in the accounts payable master data becoming a debit balance.
4. The total shown on a vendor's invoice was greater than the sum of the invoice details, resulting in an overpayment to the vendor.
5. The vendor invoiced for goods that were never delivered. The invoice was paid in its full amount.

6. The unit prices the vendor charged were in excess of those that had been negotiated. The invoice rendered by the vendor was paid.
7. A vendor submitted an invoice in duplicate. The invoice got paid twice.
8. Because of several miscellaneous errors occurring over a number of years, the total of the outstanding vendor payable balances shows a large discrepancy from the balance reflected in the general ledger.
9. Several electronic invoices were misrouted to an organization. The invoices were received, input, and paid, but the organization had never purchased anything from the vendors that were paid.
10. Goods receipts from a certain vendor are always on time. However, the invoices from this vendor are often late or never received. As a result, the organization has lost significant amounts of money by failing to obtain cash discounts for prompt payment.

For each of the process failures described, provide a two- to three-sentence description of the control plan that you believe would *best* address that deficiency. Obviously, more than one plan could exist that is germane to a particular situation. However, select *only one* plan for each of the process failures and include in your description a justification of why you believe it is *best*. When in doubt, opt for the plan that is *preventive* in nature, as opposed to plans that are *detective* or *corrective*.

P 13-6 Figure 12.4 (pg. 431) and Figure 13.3 (pg. 467) show three data flows running to the general ledger (GL) for the purpose of updating the general ledger master data.

For each of the following data flows in, show the journal entry (in debit/credit journal entry format with no dollar amounts) that would result (make and state any assumptions you think are necessary).

- GL inventory received update
- GL payable update
- GL cash disbursements update

Note: Even though the debit might come from a process other than the purchasing or AP/CD processes, show *both* the debit and credit in the first entry. Also show alternative entries under each of the following assumptions:

a. Merchandise is purchased, and a *periodic* inventory process is used.
b. Merchandise is purchased, and a *perpetual* inventory process is used.
c. Office supplies are purchased.
d. Plant assets are purchased.
e. Legal *services* are purchased.

P 13-7 Using the following table as a guide, describe for each function (see Figure 13.1 on pg. 465):

a. A risk (an event or action that will cause the organization to fail to meet it goals/objectives)
b. A control/process or use of technology that will address the risk

Function	Risks	Controls and Technology
Finance		
Accounts payable ??? (Debit) Accounts payable (credit)		
Cash disbursements Accounts payable (Debit) Cash (credit) Discounts taken (credit)		

P 13-8 Use the DFDs in Figures 13.3 (pg. 467), 13.4 (pg. 468), and 13.6 (pg. 470) to solve this problem.

Prepare a four-column table that summarizes the AP/CD processes, inputs, and outputs. In the first column, list the two processes shown in the level 0 diagram (Figure 13.3). In the second column, list the subsidiary functions shown in the four lower-level diagrams (Figures 13.4 and 13.6). For each subsidiary process listed in column 2, list the data flow names or the data stores that are inputs to that process (column 3) or outputs of that process (column 4). (See Note.) The following table has been started for you to indicate the format for your solution.

Note: To simplify the solution, do not show any reject stubs in column 4.

Solution Format Summary of the AP/CD Processes, Inputs, Outputs, and Data Stores

Process	Subsidiary Functions	Inputs	Outputs
1.0 Establish payable	1.1 Validate invoice	PO accounts payable notification Receiving report Vendor invoice Vendor master data	Validated vendor Vendor master data
	1.2 Record payable	Validated vendor invoice Inventory master data	. . . Continue solution . . .